REMARKS

Applicants thank Examiner Nguyen for providing additional time to correct the bona fide reply mailed on January 31, 2001 in response to the November 7, 2000 Office Action. Applicants have amended claim 21 according to the suggestion of Examiner Nguyen.

According to the Office:

> "[S]ince the election of species requirement (see paper 4) clearly states that Applicants were required to elect 'a single disclosed species', shifting from one species to a combination of species is not permitted"

Applicants submit that claim 21, as now amended, recites a single species, that being a scrubbing process using a two unit scrubbing system, wherein the second scrubber is smaller than the first scrubber. Applicants have added new claims 51 to 64 that depend from independent claims 21 and 26, and thus are readable on the elected species. Thus, if independent claims 21 and 26 are found allowable, all claims depending therefrom are also allowable even if the dependent claims include limitations that the Office considers to be a species that was not elected. Adding additional limitations to an independent claim is not subject to an "Election of Species" requirement because before claims can be restricted to different species, the claims must recite mutually exclusive characteristics of such species. Accordingly to MPEP §806.04(f):

> "[T]he general test as to when claims are restricted, respectively, to different species is the fact that one claims recites limitations which under the disclosure are found in a first species but not in a second, while a second claim recites limitations disclosed only for the second species and not the first."

Thus understood, the new dependent claims 51 to 64 as added herewith, recite all the limitations of independent claims 21 and 26, and as such, do not recites limitations that are mutually exclusive of the independent claims 21 and 26. Further, applicants are aware that shifting from one species to another is not allowed during prosecution but applicants have not shifted species. Instead, applicants have presented independent claims 21 and 26 and dependent claims depending therefrom.

In amending the claims, applicants have taken care to avoid the introduction of new matter and have used language found in the specification, in accordance with MPEP 608.01(o). Support for the subject matter and terminology of the amended claims is as follows:

Support for claim terminology "a packing material therein" may be found on page 50 lines 21-30, page 44, line 29 and shown in Figure 7.

Support for claim terminology "a secondary chamber having a diameter smaller than the diameter of the first chamber" and "second scrubbing chamber has a diameter about one-fifth the diameter of the first scrubbing chamber" may be found on page 47, lines 4-10.

Support for claim terminology "without a caustic reagent" may be found on page 20, lines 9-10 and page 28, line 20.

Support for claim terminology "neutral water" may be found on page 32, line 28.

Affirmation of Prior Election of Invention and Cancellation of Claims Withdrawn by Examiner

Applicants hereby affirm cancellation of claims 1-20, 30-33, and 50. Such cancellation is with the express reservation of the right to file a divisional application directed to the subject matter thereof, during the pendency of the present application, or during the pendency of a further divisional or continuing application based on and claiming priority of the present invention.

The claims pending in the application are 21-29, 34-49, and 51-64. The Office imposed an election of species requirement and as such only claims 21-26 and 27. If a generic claims is not found allowable, applicants reserved the right to file a divisional application directed to the subject matter of the non-elected species because according to the Office, in the March 28, 2000 Office Action, each species is patentably distinct.

Rejection of Claims and Traversal Thereof

In the November 7, 2000 Office Action:

claims 26-27 were rejected under 35 U.S.C. §112, second paragraph;

claim 21 was rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 4,147,756 issued to Dahlstrom et al.;

claims 21 and 26 were rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,405,590 issued to Macedo et al.;

claim 21, 26-27 were rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 4,147,756 issued to Dahlstrom et al.; and

claims 21, 26-27 were rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,405,590 issued to Macedo et al.

These rejections are hereby traversed in respect of the pending claims 21, 26-27 as amended herein.

Reconsideration of the patentability of the pending claims is therefore requested in light of the following remarks.

Rejection under 35 U.S.C. § 112, second paragraph

Applicant has amended independent claim 26 to obviate the rejection of claims 26-27. Accordingly, applicants respectfully submit that the claims now satisfy the requirements under 35 U.S.C. 112, second paragraph. Withdrawal of this rejection is respectfully requested.

Rejection under 35 U.S.C. 102(b)

Claim 21 was rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 4,147,756 issued to Dahlstrom et al, and claims 21 and 26 were rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,405,590 issued to Macedo et al. Applicants respectfully traverse. Claims 21 and 26, as amended, recite a first and second scrubber chamber wherein the second scrubber chamber has a smaller volume than the first scrubber chamber. Neither Dahlstrom et al. nor Macedo et al. disclose a second scrubbing unit having a smaller volume than the first scrubbing unit. Viewing Figure 1 of the Dahlstrom et al. reference and Figure 1 of the Macedo et al. reference as the only relevant disclosure, in the absence of any textual description, the second scrubbing unit shown in each of such references **is as large or larger than the first scrubbing unit**. Thus, the

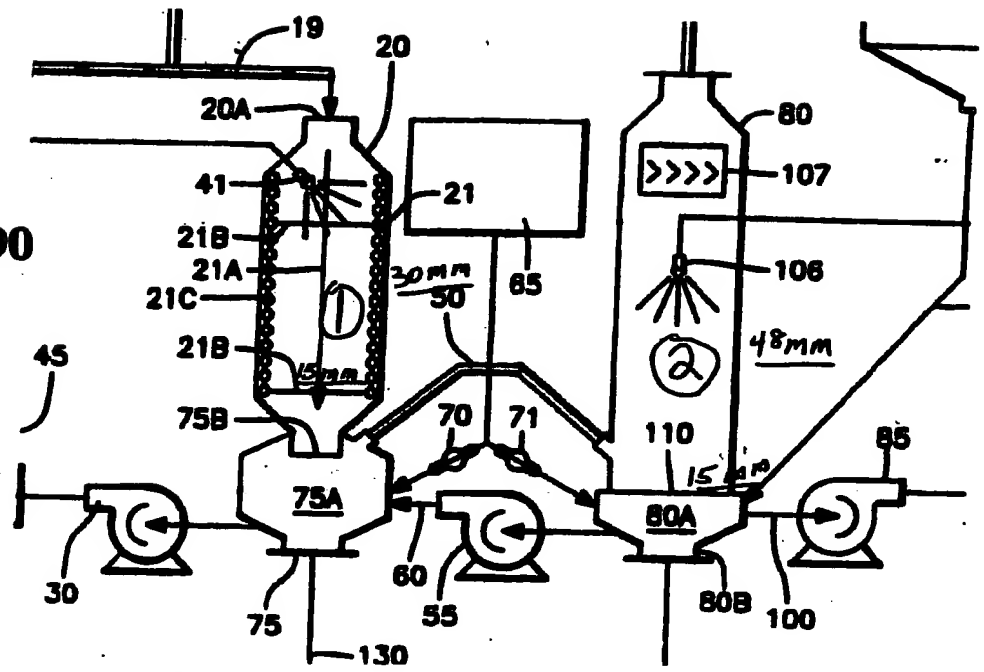
scrubbing systems recited in claims 21 and 26 are not anticipated by Dahlstrom et al. or Macedo et al. Reconsideration and withdrawal of the rejections is respectfully requested.

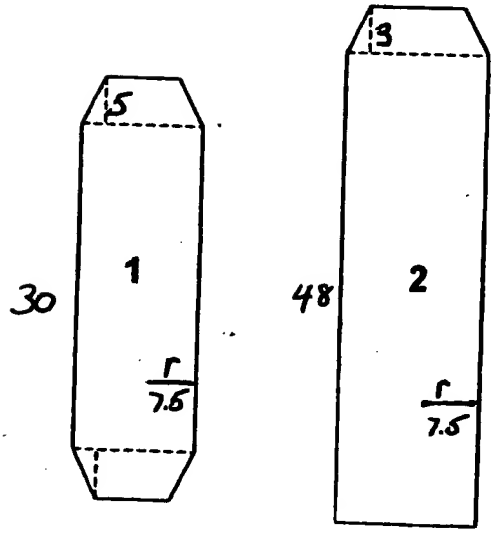
Rejection under 35 U.S.C. 103(a)

Claims 21, 26-27 were rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 4,147,756 issued to Dahlstrom et al. or U.S. Patent No. 5,405,590 issued to Macedo et al. Applicants respectfully traverse these rejections and submit that neither Dahlstrom et al. nor Macedo et al. render Applicants' claimed invention as *prima facie* obvious.

Prior to a discussion of the cited references, it is instructive to consider applicants' claimed invention. Specifically the invention relates to an abatement system that comprises a first scrubbing unit wherein the effluent gas is flowed co-currently with a scrubbing liquid to remove gases and solids. From the first stage scrubber unit, the partially treated gas flows to a second stage scrubber unit. The second scrubbing unit is smaller than the first stage scrubber unit. The smaller size enables proper wetting with a lower water flow rate. Most preferably, the diameter of the second scrubbing unit is about one fifth the diameter of the first scrubbing unit. Further, the efficiency of the two stage scrubber is high and allows the system to operate without using chemical injection agents such as a caustic agent and/or large amounts of fresh water.

In contrast, Dahlstrom et al. and Macedo et al. both disclose a two-stage scrubber system having a second scrubbing unit that is as large or larger than the first scrubbing unit. As stated above, Figure 1 of the Dahlstrom et al. and Figure 1 of the Macedo et al reference, both show a second scrubbing unit that is as large or larger than the first scrubbing unit. Applicants have performed simple volume calculations using the diameters (in millimeters) of the cylindrical vessels of the scrubbing systems shown in Figure 1 of both cited prior reference. As shown below, the volumes of the secondary scrubbing units in both the Dahlstrom et al. and Macedo et al. scrubbing systems are larger than the first scrubbing units. Further, the diameters of the secondary vessels are as large or larger than the first scrubbing units. Specifically, the Dahlstrom et al (U.S. Pat. 5,405,590) secondary unit shows a volume about one third larger and with a diameter as large as the first scrubbing unit. Likewise, the secondary unit of Macedo et al. (U.S. Pat. 4,147,756) is about four times larger and with a diameter about twice that of the first scrubbing unit.



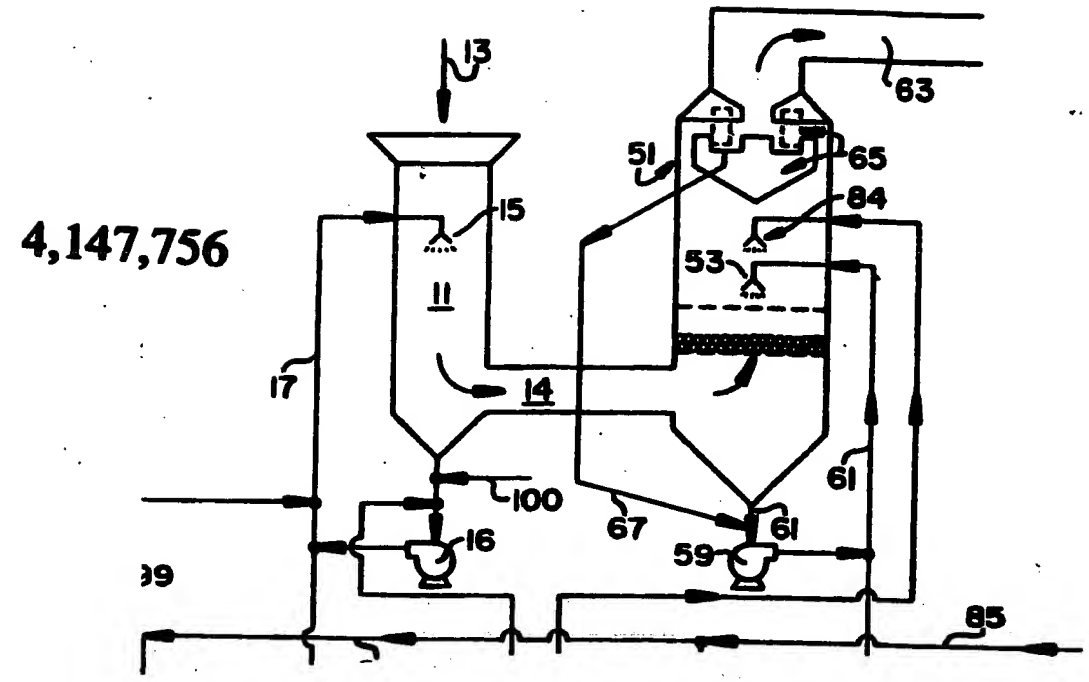


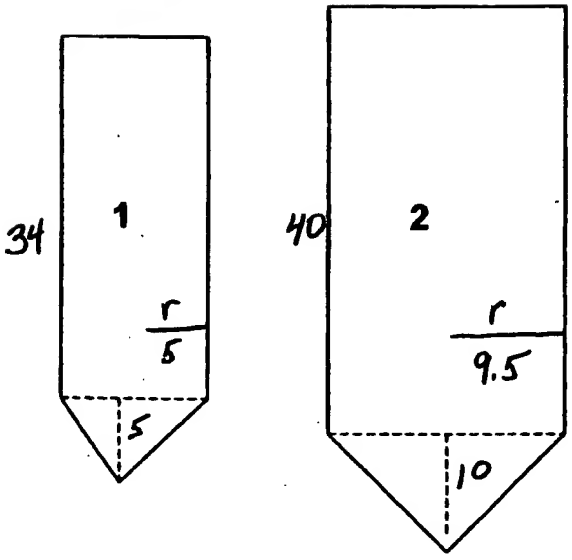
Assumption: Vessels are cylindrical with cone shap d extensions

Volume of Vessel 1 = $\pi r^2 h + 2\,(1/3\,\pi r^2 h)$ =
$\pi(7.5\text{mm})^2 30\text{mm} + 2\,(1/3\,\pi\,(7.5\text{mm})^2 5\text{mm})$ =
5301.4 mm^3

Volume of Vessel 2 = $\pi r^2 h + (1/3\,\pi r^2 h)$ =
$\pi(7.5\text{mm})^2 48\text{mm} + (1/3\,\pi\,(7.5\text{mm})^2 3\text{mm})$ =
8662.0 mm^3

Thus, the volume of Vessel 2 is about 1/3 larger than the volume of Vessel 1
and the diameter of Vessel 2 is as large as the diameter of Vessel 1





Assumption: Vessels are cylindrical with cone shaped extensions

Volume of Vessel 1 = $\pi r^2 h + (1/3\ \pi r^2 h) =$
$\pi(5mm)^2 34mm + (1/3\ \pi\ (5mm)^2 5mm) =$
$2800\ mm^3$

Volume of Vessel 2 = $\pi r^2 h + (1/3\ \pi r^2 h) =$
$\pi(9.5mm)^2 40mm + (1/3\ \pi\ (9.5mm)^2 10mm) =$
$12{,}286.1\ mm^3$

Thus, the volume of Vessel 2 is about 4 times greater than the volume of Vessel 1
and the diameter of Vessel 2 is about 2 times larger than the diameter of Vessel 1

Thus, neither reference discloses, teaches or suggests the use of a smaller secondary scrubbing unit to increase efficiency and reduce the need for large amounts of make-up water. Instead, the scrubbing systems of Dahlstrom et al. and Macedo et al. are overdesigned and require excessive scrubbing liquid in relation to applicants' claimed invention.

The Office has failed to give weight to the advantages and benefits of the present invention as part of the "invention as a whole" and cites references that do not disclose or teach such advantages or benefits. For instance Macedo et al. provides no information on the advantages of a smaller diameter scrubbing unit with the concomitant reduction in water consumption and increased efficiency per liter of water. Instead, Macedo et al. discusses redirecting fluid from one scrubber to another. Additionally, Macedo et al. discloses the reduction of temperatures in the secondary scrubber to cause condensation and reduce evaporation. (See column 3, lines 8-15) to increase water content between the scrubber units. Clearly, there is no discussion regarding the size of either scrubbing vessel. Likewise, Dahlstrom et al. describes the redirection of fluids between scrubbing units after the addition of a neutralizing agent. Again, the size of the scrubbing vessels is not addressed. Obviously, the benefits of a smaller secondary unit having a substantially reduced diameter, e.g., about one fifth that of the first scrubber unit is not described, discussed or taught by either cited reference. As stated above, the scrubbing systems of Dahlstrom et al. and Macedo et al. are overdesigned and required excessive scrubbing liquid in relations to applicants' claimed invention.

The Office admits that the prior art does not disclose a second scrubbing unit that is smaller than the first scrubbing unit. However, the Office contends that both cited references teach a two stage scrubbing system and that it would have been obvious to one having ordinary skill in the art to optimize the size of the scrubber units to obtain the best results. Applicants disagree because the cited references have provided no guidance as to which parameters are critical and have given no direction as to which of the many choices of different sizes is likely to be successful.

It is incumbent on the Office to provide some suggestion or teaching in the prior art that would lead one skilled in the art to proceed in the direction of applicant's claimed invention. Applicants submit that the Office has not provided objective or specific teachings or suggestions in the cited prior art to motivate one skilled to modify said references. Moreover, what is the asserted motivation put forth in either reference to reduce the size of the second scrubber unit. Neither reference discusses the importance of minimizing the overall volume of the secondary chamber. The Courts have addressed this issue numerous times and have stated "The mere fact that the prior art could be so modified would not have made the modification obvious unless the prior art suggested the desirability of the modification" *In re Mills*, 16 USPQ2d 1430 (Fed. Cir. 1990) quoting *In re Gordon* 221 USPQ 1125 (Fed. Cir. 1984). It is further stated by the *Mills* Court that "It is not pertinent whether the prior art possesses the functional characteristics of the claimed

invention if the reference does not describe or suggest its structure." Thus, this allegedly "obvious" maneuver is supported only by the Office's reinterpretation of the art in light of applicants' disclosure.

The Office appears to argue that it would be obvious for one of ordinary skill in the art to try varying every parameter of a system in order to optimize the effectiveness of the system even if there is no evidence in the record that the prior art recognizes that particular parameters affect the result. As the Courts have said several times "obvious to try" is not the standard of 35 U.S.C §103. *In re Tomlinson*, 150 USPQ 623 (CCPA 1966)

The controlling question is whether the difference between the cited prior art and applicants' invention as a whole would have been obvious. Applicants argue that it is impossible to recognize by the teachings of the prior art that a specific volume of the second scrubbing unit is necessary to maximize the effectiveness of the scrubbing system. **Initially, it is essential to recognize the importance of reducing the size of the second chamber before the obviousness of conducting experiments to determine the correct size ratio to maximize treatment capacity is even considered.** Determining the optimum volume size of the second scrubbing unit in relation to the first scrubbing unit can only be determined from data representing varying tank volume, fixed throughput, fixed contact area, varying throughput and the like. These types of experiments are not suggested by the teachings of the prior art because neither reference recognizes the problem that applicants are overcoming by reducing the same of the scrubbing chamber to reduce water input while increasing efficiency of the process. Thus, the size of the second scrubbing chamber in relation to the first scrubbing chamber is not recognized by the prior art to be a result-effective variable, and as such, the direction taken by applicants is not obvious.

Also, applicants have discovered that effective abatement can be accomplished with a neutral water scrubbing liquid without the addition of precipitating reagents, such as sodium hydroxide, to the scrubbing liquids. In contrast, both cited references describe the requirement of adding a precipitating reagent to at least one of the scrubbing liquids. For example, Macedo et al. describes the use of sodium hydroxide in the first scrubbing liquid for neutralizing acidic contaminants in the exhaust stream. (See column 2, lines 33-35) Likewise, Dahlstrom et al. describes the addition of a sodium-base reagent in the secondary scrubbing system wherein sodium hydroxide may be present in various degrees. (See column 5, lines 17-39)

Accordingly, for reasons set forth above applicants contend that the Office has not met its burden of establishing a *prima facie* case of obviousness. Thus, applicants respectfully request that the rejection of claims 21, 26-27 on the basis of obviousness, be withdrawn.

FEES PAYABLE

Applicants have added additional claims 51-65 but because claims 1-20, 30-33, and 50 were cancelled due to a restriction requirement no addition fees are due for the additional claims as set forth below.

CLAIMS AS AMENDED						
(1)	(2) Claims Remaining After Amendment	(3)	(4) Highest Number Previously Paid for	(5) No. of Extra Claims Present	(6) Rate	(7) Additional Fees
Total Claims	* 19	Minus	** 50	0	x $ 18.00	= $ 0.00
Indep. Claims	*3	Minus	**19	0	x $ 40.00	= $ 0.00
Total Additional Fee For This Amendment						$0.00

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Conclusion

The pending claims, as now amended, patentably distinguish over the prior art, and in view of the forgoing remarks, it is respectfully requested that all rejections be withdrawn thereby placing the application in condition for allowance. Notice of the same is earnestly solicited. In the event that any issues remain, Examiner Nguyen is requested to contact the undersigned attorney at (919) 419-9350 to resolve same.

Respectfully submitted

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APPENDIX A

21. (Twice Amended) A scrubbing process for the abatement of a gas component in a gas stream containing same, said scrubbing process comprising introducing the gas stream and a scrubbing liquid to a first gas/liquid contacting chamber and effecting gas/liquid contacting therein, wherein said process additionally at least one of the steps of:

(a) introducing a chemical reagent for contact with the gas component to remove same from the gas stream in said gas/liquid contacting;

(b) introducing to the gas stream prior to entry thereof into the contacting chamber, a gas to enhance removal of silane from the gas stream when present therein;

(c) flowing the effluent gas from the first contacting chamber to a second gas/liquid contacting chamber and introducing to said second contacting chamber a second scrubbing liquid for gas/liquid contacting therein, wherein the first gas/liquid contacting in the first chamber comprises cocurrent flow of the gas stream and scrubbing liquid and wherein the second gas/liquid contacting in the second contacting chamber comprises countercurrent flow of the gas stream and the second scrubbing liquid through the second contacting chamber, wherein said second contacting chamber has a smaller volume than that of said first contacting chamber;

(d) introducing an antifoam agent to scrubbing liquid for said gas/liquid contacting, to suppress foam production in the contacting chamber;

(e) suppressing deposition of calcium carbonate from scrubbing liquid containing calcium, including a step selected from the group consisting of:

(1) imposing a magnetic field on scrubbing liquid prior to use thereof in the contacting chamber;

26. (Amended) A scrubbing process for treatment of an effluent gas including acid gas components and water-scrubbable components other than acid gas component, said process comprising:

scrubbing the effluent gas with a neutral [an] aqueous scrubbing liquid in a first scrubbing zone to remove the acid gas components of the effluent gas, with co-current flow contacting of the

aqueous scrubbing liquid and effluent gas with one another to yield effluent gas reduced in acid gas components;

flowing the effluent gas reduced in acid gas components from the first scrubber unit to a second scrubber unit; and

scrubbing the effluent gas with a second aqueous scrubbing liquid in the [a] second scrubbing zone to remove water-scrubbable components other than acid gas component from the effluent gas, with counter -current flow contacting of the second aqueous scrubbing liquid and effluent gas with one another to yield effluent gas reduced in acid gas components and water-scrubbable components other than acid gas components, wherein said second scrubbing zone has a volume smaller than that of said first scrubbing zone. [and

flowing the effluent gas reduced in acid gas components from the first scrubber unit to the second scrubber unit. {Joe Sweeney comments: Note that both acid gas components and water-scrubbable components other than acid gas components would be reduced in concentration after passing through the co-current flow contacting stage. In addition, water reactive gases would be reduced in concentration in the co-current stage. Acid gas components and water-soluble components are reduced in the co-current stage to concentrations approaching those corresponding to the respective equilibrium values of the acid gas components and water-soluble components in the aqueous scrubbing liquid.}]

27. (Amended) The process according to claim 26, wherein the first scrubbing zone is a vessel enclosing an interior volume containing a bed of packing medium [volume of said second scrubbing zone is substantially smaller than the volume of said first scrubbing zone].

APPENDIX B

21. A scrubbing process for the abatement of a gas component in a gas stream containing same, said scrubbing process comprising introducing the gas stream and a scrubbing liquid to a first gas/liquid contacting chamber and effecting gas/liquid contacting therein, wherein said process additionally at least one of the steps of:

(a) introducing a chemical reagent for contact with the gas component to remove same from the gas stream in said gas/liquid contacting;

(b) introducing to the gas stream prior to entry thereof into the contacting chamber, a gas to enhance removal of silane from the gas stream when present therein;

(c) flowing the effluent gas from the first contacting chamber to a second gas/liquid contacting chamber and introducing to said second contacting chamber a second scrubbing liquid for gas/liquid contacting therein, wherein the first gas/liquid contacting in the first chamber comprises cocurrent flow of the gas stream and scrubbing liquid and wherein the second gas/liquid contacting in the second contacting chamber comprises countercurrent flow of the gas stream and the second scrubbing liquid through the second contacting chamber, wherein said second contacting chamber has a smaller volume than that of said first contacting chamber;

(d) introducing an antifoam agent to scrubbing liquid for said gas/liquid contacting, to suppress foam production in the contacting chamber;

(e) suppressing deposition of calcium carbonate from scrubbing liquid containing calcium, including a step selected from the group consisting of:

(1) imposing a magnetic field on scrubbing liquid prior to use thereof in the contacting chamber;

(2) adjusting the pH of the scrubbing liquid to maintain pH thereof below 8.5;

(3) flowing the scrubbing liquid through a lime-soda ash bed prior to use of the scrubbing liquid in the contacting chamber; and

(4) precipitating the calcium content of the scrubbing liquid prior to use of the scrubbing liquid in the contacting chamber; and

(f) suppressing solids formation in a passage of the scrubbing system, said passage comprising a conduit to a pressure sensing device, including a step selected from the group consisting of flowing a purge gas through the passage to suppress solids formation therein, and heating the passage to suppress solids formation therein.

22. A process for treating a gas stream containing a silane component to abate components of the gas stream, said process comprising scrubbing the gas stream with an aqueous scrubbing medium, and contacting the gas stream prior to scrubbing with a gas to enhance removal of the silane component in the scrubbing step.

23. The process according to claim 22, wherein said gas comprises an oxygen-containing gas.

24. The process according to claim 22, wherein said gas comprises nitrogen gas.

25. A scrubbing process wherein a gas to be scrubbed is flowed through an inlet structure to a scrubbing apparatus, and the gas contains a silane component, said process comprising introducing to the gas flowed through the inlet structure a gas to enhance removal of the silane component in the scrubbing apparatus, wherein said gas inlet structure comprises (i) an upper inlet portion including an annular gas introduction passage including a gas-permeable wall bounding a gas flow passage of the upper inlet portion, and through which said silane-removal-enhancing gas may be flowed, (ii) a lower inlet portion including an annular overflow liquid reservoir with an inner wall having an inner wall surface bounding a gas flow passage through the lower inlet portion of the inlet structure producing on overflow a falling film of liquid on the inner wall surface to flush such inner wall surface of solids and solids-forming components of the gas stream and (iii) a gas inlet tube extending into the gas flow passage and terminating at a lower end in one of the upper inlet and lower inlet portions of the gas inlet structure;

wherein said gas inlet structure is constructed and arranged to introduce silane-containing gas from a source thereof to the scrubbing apparatus.

26. (Amended) A scrubbing process for treatment of an effluent gas including acid gas components and water-scrubbable components other than acid gas component, said process comprising:

scrubbing the effluent gas with a neutral aqueous scrubbing liquid in a first scrubbing zone to remove the acid gas components of the effluent gas, with co-current flow contacting of the aqueous scrubbing liquid and effluent gas with one another to yield effluent gas reduced in acid gas components;

flowing the effluent gas reduced in acid gas components from the first scrubber unit to a second scrubber unit; and

scrubbing the effluent gas with a second aqueous scrubbing liquid in the second scrubbing zone to remove water-scrubbable components other than acid gas component from the effluent gas, with counter -current flow contacting of the second aqueous scrubbing liquid and effluent gas with one another to yield effluent gas reduced in acid gas components and water-scrubbable components other than acid gas components, wherein said second scrubbing zone has a volume smaller than that of said first scrubbing zone.

27. (Amended) The process according to claim 26, wherein the first scrubbing zone is a vessel enclosing an interior volume containing a bed of packing medium

28. A scrubbing process for treatment of an effluent gas to remove water scrubbable components of the effluent gas, by contacting the effluent gas with an aqueous scrubbing medium in a gas/liquid contacting zone, comprising suppressing deposition of calcium carbonate from aqueous scrubbing medium containing calcium, including a suppressing step selected from the group consisting of:

(1) imposing a magnetic field on scrubbing liquid prior to use thereof in the contacting zone;

(2) adjusting the pH of the scrubbing liquid to maintain pH thereof below 8.5;

(3) flowing the scrubbing liquid through a lime-soda ash bed prior to use of the scrubbing liquid in the contacting chamber.

29. A scrubbing process for treatment of an effluent gas to remove water scrubbable components of the effluent gas, by contacting the effluent gas with an aqueous scrubbing medium in a gas/liquid contacting chamber, said process comprising precipitating the calcium content of the aqueous scrubbing medium prior to use of the aqueous scrubbing medium in the contacting chamber, including a step of contacting the aqueous scrubbing medium with a chemical agent effective to precipitate the calcium content of the aqueous scrubbing medium.

34. A process for abating fluorocompound in a gas stream containing same, comprising scrubbing the gas stream with an aqueous medium in the presence of a reducing agent.

35. The process according to claim 34, wherein the reducing agent includes at least one compound from the group consisting of sodium thiosulfate, ammonium hydroxide and potassium iodide.

36. The process according to claim 34, wherein the reducing agent includes sodium thiosulfate.

37. The process according to claim 34, wherein the reducing agent includes ammonium hydroxide.

38. The process according to claim 34, wherein the reducing agent includes potassium iodide.

39. The process according to claim 34, wherein the reducing agent is injected into the aqueous medium during the scrubbing.

40. The process according to claim 34, wherein the fluorocompound comprises fluorine gas.

41. The process according to claim 34, wherein the fluorocompound comprises a gaseous fluoride compound.

42. The process according to claim 34, wherein the fluorocompound-containing gas stream comprises effluent of a semiconductor manufacturing process.

43. The process according to claim 34, wherein the fluorocompound-containing gas stream comprises effluent from a plasma reactor cleaning operation in a semiconductor manufacturing facility.

44. The process according to claim 34, further comprising monitoring a process condition of the gas stream and introducing the reducing agent in an amount dependent on said process condition.

45. The process according to claim 44, wherein the process condition of the gas stream is pH.

46. The process according to claim 34, wherein the process condition of the gas stream is fluorocompound concentration therein.

47. A process for abatement of fluorocompound from an effluent stream containing same, comprising contacting the gas stream with an aqueous medium in the presence of a reducing agent that is reactive with the fluorocompound to reduce same in the effluent stream without formation of OF_2.

48. The process of claim 47, wherein the reducing agent is selected from the group consisting of potassium hydroxide and sodium hydroxide.

49. A process for abatement of silane from an effluent stream containing same, comprising scrubbing the effluent stream with an aqueous medium, and introducing clean dry air to at least one of the effluent stream and the aqueous medium, in a sufficient amount and at sufficient rate to reduce silane concentration in the effluent stream.

51. The process according to claim 26 wherein the scrubbing liquid in the second scrubbing zone contains no caustic reagent.

52. The process according to claim 21 wherein the scrubbing liquid in the first contacting chamber is neutral water.

53. The process according to claim 21 wherein the first scrubbing liquid contains no caustic reagent.

54. The process according to claim 21 wherein the second scrubbing liquid contains no caustic reagent.

55. The process according to claim 21 wherein the second contacting chamber has a smaller diameter than the first contacting chamber.

56. The process according to claim 26 wherein the second scrubbing zone has a smaller diameter than the first scrubbing zone.

57. The process according to claim 21 wherein the diameter of the second contacting chamber is about one-fifth the diameter of the first contacting chamber.

58. The process according to claim 26 wherein the diameter of the second scrubbing zone is about one-fifth the diameter of the first scrubbing zone.

59. The process according to claim 21 wherein the second contacting chamber has a relatively substantially lower water flow rate than the first contacting chamber.

60. The process according to claim 26 wherein the second scrubbing zone has a relatively substantially lower water flow rate than the first scrubbing zone.

61. (Amended) A scrubbing process for the abatement of a gas component in a gas stream containing same, said scrubbing process comprising:

introducing the gas stream and a scrubbing liquid to a first gas/liquid contacting chamber and effecting gas/liquid contacting therein; flowing the effluent gas from the first contacting chamber to a second gas/liquid contacting chamber and introducing to said second contacting chamber a second scrubbing liquid for gas/liquid contacting therein, wherein the first gas/liquid contacting in the first chamber comprises co-current flow of the gas stream and scrubbing liquid, and wherein the second gas/liquid contacting in the second contacting chamber comprises countercurrent flow of the gas stream and the second scrubbing liquid through the second contacting chamber, wherein said second contacting chamber has a smaller volume than that of said first contacting chamber.

62. The process according to claim 61 further comprising introducing a chemical reagent for contact with the gas effluent component to remove same from the gas effluent in the first scrubbing zone.

63. The process according to claim 61 further comprising introducing a gas into the first scrubbing zone to enhance removal of silane, if present.

64. The process according to claim 61 further comprising introducing an antifoam agent to scrubbing liquid for said gas/liquid contacting, to suppress foam production in the first and/or second scrubbing zone.